

5    THE FOLLOWING IS CLAIMED:

1. An electroless method for treating a substrate having an electrically conductive surface comprising:

10        contacting at least a portion of the surface with a medium comprising at least one silicate and having a basic pH and wherein said medium is substantially free of chromates,

          drying the substrate,

          rinsing the substrate,

          drying the substrate.

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2.     An aqueous medium for use in an electroless process for treating a conductive surface comprising a combination comprising water, at least one water soluble silicate, colloidal silica, at least one dopant and wherein the medium has a basic pH and is substantially free of chromates and VOCs.

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3. An electroless method for treating a metallic or an electrically conductive surface comprising:

25        exposing at least a portion of the surface to a medium comprising a combination comprising water, colloidal silica, and at least one water soluble silicate wherein said medium has a basic pH,

          drying the surface,

          rinsing the surface,

          drying the surface; and

30        contacting the treated surface with at least one composition that adheres to the treated surface.

4. The method of Claim 1 wherein the medium comprises water, sodium silicate and colloidal silica.

5            5. The method of Claim 1 wherein the surface comprises at least one member selected from the group consisting of copper, nickel, tin, iron, zinc, aluminum, magnesium, stainless steel and steel and alloys thereof.

10           6. The method of Claim 1 wherein said rinsing comprises contacting the surface with a second medium comprising a combination comprising water and at least one water soluble compound selected from the group consisting of carbonates, chlorides, fluorides, nitrates, zirconates, titanates, sulphates, water soluble lithium compounds and silanes.

15           7. The method of Claim 1 wherein the medium comprises at least one dopant selected from the group consisting of zinc, cobalt, molybdenum and nickel.

             8. The method of Claim 1 wherein said first drying is conducted at a temperature of at least about 120C.

20           9. The method of Claim 1 further comprising applying at least one coating upon the surface.

             10. The medium of Claim 2 wherein the medium comprises a combination comprising water, colloidal silica, greater than 1 wt.% of sodium silicate and further  
25        comprises at least one dopant selected from the group consisting of cobalt, nickel, molybdenum and zinc.

             11. The method of Claim 1 further comprising forming a layer comprising silica upon the surface.

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             12. The medium of Claim 3 wherein said dopant comprises at least one member selected from the group consisting of from the group of titanium chloride, tin chloride, zirconium acetate, zirconium oxychloride, calcium fluoride, tin fluoride, titanium fluoride, zirconium fluoride; ammonium fluorosilicate, aluminum nitrate; magnesium

5 sulphate, sodium sulphate, zinc sulphate, copper sulphate; lithium acetate, lithium bicarbonate, lithium citrate, lithium metaborate, lithium vanadate and lithium tungstate.

13. The method of Claim 1 wherein said medium comprises sodium silicate, water, colloidal silica and at least one dopant, said rinsing is conducted with a second  
10 medium comprising water and at least one member selected from the group consisting of silanes and colloidal silica and further comprising applying at least one secondary coating comprising at least one member selected from the group consisting of acrylics, urethanes, polyester and epoxies.

15 14. The method of Claim 1 wherein said rinsing comprising contacting said surface with a solution comprising water and at least one dopant.

15. The method of Claim 14 wherein the dopant comprises at least one member selected from the group consisting of molybdenum, chromium, titanium, zircon,  
20 vanadium, phosphorus, aluminum, iron, boron, bismuth, gallium, tellurium, germanium, antimony, niobium, magnesium, manganese, zinc, aluminum, cobalt, nickel and their oxides and salts.

16. The method of Claim 3 further comprising prior to said exposing contacting  
25 said surface with a pretreatment comprising at least one member selected from the group consisting of acid and basic cleaners.

17. The method of Claim 1 wherein said medium further comprises at least one  
dopant.

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18. The method of Claim 3 wherein said adherent composition comprises at least one member chosen from the group of latex, silanes, epoxies, silicone, amines, alkyds, urethanes, polyester and acrylics.

5           19. An article comprising an electrically conductive substrate comprising zinc  
wherein at least a portion of which has an inorganic and chromate free surface and at  
least one composition adhered to said article and wherein said has an ASTM B117  
exposure to white rust of greater than 72 hours.

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